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UNIVERSITY OF IDAHO
COLLEGE OF AGRICULTURE

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Second Year Canning

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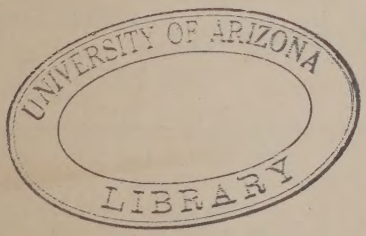

COOPERATIVE EXTENSION SERVICE IN AGRICULTURE AND HOME ECONOMICS
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AGRICULTURE AND UNITED STATES DEPARTMENT OF
AGRICULTURE COOPERATING

BOYS' AND GIRLS' CLUBS

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Second Year Canning Requirements

For Completion

- 10 quarts of fruit
- 10 quarts of vegetables (including greens, peas, and corn)
- 5 quarts of vegetable soup mixtures

For Exhibits

- 3 varieties of fruit
- 3 varieties of vegetables
- 2 varieties of vegetable soup mixtures

Second Year Canning

Methods of Canning

HOME canning was actively promoted during the World War and has progressed rapidly ever since. Some of the methods recommended during and following the war period were not reliable and yielded products which not only did not keep well, but were sometimes poisonous to the family. An active educational campaign must be continually in progress in order to inaugurate methods which have been found trustworthy and to correct faulty methods which have been directly responsible for several outbreaks of botulism, besides causing great economic loss through spoilage. The commercial canners have led the way in developing reliable methods of canning by applying the results of scientific research to their factory procedures. They point with pride to the fact that not a single outbreak of botulinus poisoning has been traced to foods canned in American factories since 1925. The remarkable success of the canning centers operated during the depression is ample evidence that a high degree of efficiency can be developed in semi-commercial and home canning where these same procedures are put into operation.

The Successful Canner

The successful canner must know not only how to process foods but also why such a procedure is followed. Canning has three distinct processes involved: (1) to cook the raw material; (2) to inactivate the spoilage enzymes, yeasts, molds, and bacteria; and (3) to hermetically seal the food.

Non-acid or low-acid foods.

Non-acid foods, such as the vegetables, peas, beans, corn, asparagus, fresh beets, etc., and meats, fish, and poultry, should be canned in steam pressure cooker where high temperatures can be obtained by applying 10 to 15 pounds of steam pressure. It is this class of foods in which the greater amount of spoilage occurs and in which the deadly botulinus poison develops. The steam pressure method of canning is especially imperative in higher elevations where water boils at lower temperatures.

The Cause of Spoilage

The types of bacteria, yeasts, and molds which cause spoilage vary with different foods. There are approximately two hundred million of them in a teaspoonful of garden soil. Some of the most heat resistant forms of bacteria are common decay bacteria in the soil. Consequently a low-growing vegetable like spinach may be heavily coated with soil particles and the fuzzy coating on string beans may shelter bacteria and make them difficult to remove.

Some common types of spoilage in canned foods:

Fermentation.—Acid and gas are produced by the action of bacteria and yeasts during fermentation causing the food to become sour or "cheesy." Tin cans may bulge or seals on glass jars may be broken by the accumulated gas. Yeasts almost invariably cause this condition in fruit and fruit products whereas bacteria attack the vegetables and meats.

Flat sour.—The bacteria causing flat-sour spoilage produce acid without gas. They grow best at temperatures about 130° to 140° F., and sometimes cause spoilage in canned foods not properly cooled after processing or held at too high storage temperatures. Corn, peas, and string beans are subject to flat-sour spoilage.

Putrefaction.—The growth of putrefactive bacteria in canned food is marked by gas production, a bad odor, and the softening and darkening of the food. Putrefaction usually occurs in foods low in acidity, such as meats, peas, and corn.

Mold.—These fuzzy growths are familiar to everyone. They grow readily in acid and are one of the chief causes of spoilage in fruits. They are killed easily by heating and will not grow without air. Hence their growth is an indication that the jar is not sealed.

Turbidity.—Some bacteria cause the liquid to become turbid or milky. You can see it readily in glass jars. Over-processing or starch in some foods may cause a similar appearance.

Odors and Flavors.—The presence of any foreign odor or flavor should be sufficient to condemn the contents of the can or jar.

The addition of small quantities of an acid such as vinegar or lemon juice, to a non-acid vegetable or meat does not change the acidity of the food enough to permit processing in the boiling-water bath. This can be done only if enough acid is added to pickle the food. For example, beets are a non-acid vegetable and need to be processed under steam pressure, but when they are pickled in vinegar they may be handled as an acid product in the boiling-water bath.

Examination of Canned Foods Before Use

All foods should be inspected before being prepared for the table. Canned food is no exception to this rule. If there is any evidence of spoilage, the food should be discarded and non-acid vegetables and meats should be burned.

Inspect the can or jar before opening. In tin cans both ends should be flat and curved slightly inward. Neither end should bulge or snap back when pressed. All seams should be tight and clean, with no traces of leaks. In glass jars there should be no bulging of the rubber and no signs of leakage.

When the container is opened, there should not be any sudden outburst of air or spurting of liquid. The odor should be characteristic of the product. Any different odor probably indicates

spoilage. The inside of tin cans should be smooth and clean or well lacquered and not markedly corroded. Food may be left in a tin can after it is opened, provided it is covered and kept cold just as is done with any cooked food. Acid foods and tomatoes may dissolve minute quantities of iron from the can and acquire a slightly metallic flavor, but this is harmless. The purple that develops in red fruits, and sometimes in peaches and pears canned in tin, is merely a change in color pigments and is also harmless.

The broth over canned meats and chicken may or may not be jellied, depending on the quantity of connective tissue and cartilage in the meat. If it is liquid, this is no indication of spoilage.

Never taste to discover spoilage. When spoilage has occurred in non-acid foods, there is always a possibility that even a taste may cause serious illness or death. For this reason, it is good practice to boil all canned non-acid vegetables before using them. The processes recommended for meats are much heavier than for vegetables and should destroy all dangerous bacteria.

The Steam Pressure Cooker

A steam pressure cooker is required for processing meats, practically all vegetables except tomatoes, and other non-acid or low-acid foods. Such foods should not be canned at home if a pressure cooker is not available. Other methods of preservation should be used to make the products safe, such as freezing, drying, pickling; storing for fruits and vegetables, and curing for meats.

The pressure cooker is specially designed to obtain temperatures higher than can be reached in a boiling-water bath or an ordinary steamer. It is impossible to heat water to a temperature higher than the boiling point at the particular altitude at which the test is made, unless the vessel has a tight fitting cover and clamped down so that the steam is held in under pressure. Pressure cookers, now manufactured in aluminum and steel, serve this purpose.

In selecting a pressure cooker the following points should be carefully checked:

A pressure cooker should be strongly built, and the top should be held on tightly by a number of lugs or clamps or a strong band so that there can be no leakage of steam. The top must be fitted with an air outlet or petcock, a safety valve (petcock and safety valve may be combined), and a pressure gauge. It is desirable, also, to have a thermometer set into the top, so that the pressure can be checked against the temperature. If non-acid foods are being canned for sale, the pressure cookers should be equipped with thermometers to make certain that the processing will be adequate. Pressure gauges may become inaccurate after a period of use. Those that have the indicator soldered or otherwise attached permanently to the stem will remain in good condition longer than gauges in which the indicator is held in place by friction only.

The size of the pressure cooker should be suitable to the kind of containers and the probable number to be handled at one time.

For home use, pressure cookers of from 18- to 30-quart capacity are satisfactory. The smaller steam pressure outfits, of 10- to 12-quart capacity, are intended for cooking rather than canning.

In operating and caring for a pressure cooker follow the directions of the manufacturer. Certain points need special attention.

Pour boiling water into the cooker to a depth of about 1 inch, or until the level is just below the rack that holds the containers. Add more water up to this level after processing each load, so that the cooker will not boil dry and be damaged.

Allow space between the containers for the circulation of steam. Tin cans may be arranged in several tiers by using a wire rack or metal strips to keep the cans apart and permit the circulation of steam.

After the cooker is loaded, adjust the cover so the mark on the cover coincides with the mark on the kettle part and fasten it securely. If there are several clamps, fasten moderately tight those opposite each other, a pair at a time; then go back over the whole set and tighten each pair.

See that no steam escapes anywhere except at the petcock.

Allow the petcock to remain open until the steam escapes (making a hissing sound) from it in a steady stream for 4 to 7 minutes, indicating that no air remains inside. Otherwise the pressure will be partly due to air, and the temperature will fall short of the required degree. Then close the petcock and allow the pressure to rise until the gauge registers the desired point. Count time from the moment the desired pressure is reached. Keep close watch on the cooker while in use. Regulate the heat carefully so as to maintain a uniform pressure during the processing period, and do not allow drafts to blow on the cooker. Fluctuations in pressure, as from 10 to 15 pounds and down again, should always be avoided. This may cause loss of liquid from glass jars. It is especially important to keep the pressure from going so high that the safety valve releases the steam suddenly, nor should the steam be allowed to escape suddenly by opening the petcock.

At the end of the processing period remove the cooker from the fire.

When using glass jars, or No. 3 or larger tin cans, allow the cooker to cool until the gauge registers zero before opening the petcock, and then remove the cover gradually. Remove glass jars one at a time and seal tightly at once.

Adjustments vary with the types of jar. If liquid has been lost, do not open the jars to add more.

Do not hasten the cooling of a pressure cooker by applying cold water or wet cloths, or by placing it on a cold surface. To do so may crack the cooker.

If tin cans smaller than No. 3 are used, open the petcock gradually at the end of processing and allow the steam to escape slowly.

When opening the pressure cooker, tilt the cover so that the steam emerges away from the operator.

Wash the pressure cooker after it has been used. Keep the surfaces which form the closure between pot and cover clean. This will reduce the tendency of the cover to stick. Use care not to dent or roughen these surfaces. Do not use an abrasive on them. New pressure cookers sometimes leak steam slightly at this junction, but after being heated several times the surfaces should adjust themselves to each other to make the closure tight.

Keep the safety valve in good working condition. If it is a valve of the ball-and-socket type, wash it each day after using. A drop of oil will keep it from rusting. A safety valve that fails to operate properly may cause an accident.

Use a toothpick to keep the opening of the pressure gauge clean. Do not immerse the pressure gauge in water.

Directions for Checking the Accuracy of the Steam Pressure Gauge for Indicating the Temperature Inside the Steam Pressure Cooker

I. The simplest method for determining whether the steam pressure gauge is accurate is to take it off and send it back to the manufacturers. They will be glad to check it against a master gauge. After the gauge is returned to you, put some caulking compound (like the plumbers use) on the threads and screw it into place.

II. To check it yourself, it is necessary to have a maximum temperature thermometer which will work at the high temperatures which are found inside the steam pressure cooker. These thermometers work like a fever thermometer. When the thermometer is exposed to heat, the mercury goes up and stays until you purposely shake it down again. Home demonstration agents usually have these thermometers with them.

To test the temperature inside the cooker:

A. Shake the mercury down in your thermometer.

B. Place water and rack in your pressure cooker just the same as though you were going to do some canning. Now put the thermometer in a can or jar containing about 2 inches of water, (the thermometer should stand in an upright position) and place it in the cooker.

C. Put the lid on the cooker and heat it up just the same as though you were canning. Exhaust the air by leaving the petcock open until 7 minutes after steam begins to escape from 12-quart and smaller sizes of cookers; 10 minutes in 18-quart; and 12 minutes in 25-quart cookers.

D. Close the petcock and let the pressure rise to 10 pounds. If the pressure goes above 10 pounds, note the highest pressure reached.

E. Remove the cooker from the heat and let it stand until the pressure registers zero when you can open it and read the thermometer.

F. Shake the mecury down and repeat the test at 15 pounds pressure.

G. The following table shows the temperatures in degrees Fahrenheit which correspond with the correct steam pressure. Check the temperature shown on the thermometer against the steam pressure necessary to give this temperature.

Pounds Pressure per square inch	Temperature degrees Fahrenheit
1	212.0
2	215.4
3	221.5
4	224.4
5	227.1
6	229.6
7	232.3
8	234.7
9	237.0
10	239.4
11	241.5
12	243.7
13	245.8
14	247.8
15	249.8
16	251.6
17	253.4
18	255.4
19	257.0
20	258.8

The difference between the steam pressure maintained while the thermomenter was in the cooker and the steam pressure shown in the table to correspond with the temperature shown on the thermometer is the amount that the pressure gauge is out of adjustment. Commonly pressure gauges read too high so it usually will be necessary to operate the cooker at pressures higher than appear correct.

There are two general reasons why pressure gauges do not read correctly: (1) The spring in the steam pressure gauge becomes weakened after a period of use or some foreign substance may get into it so it cannot work freely; and (2) steam pressure gauges will be found to be affected by altitude. This difference, however, will be compensated for by following the above procedure.

Altitude Affects the Pressure Cooker

All pressure gauges are set by the factory to operate at sea level.

Taking it for granted that your steam pressure gauge is accurate, as you would expect on a new cooker or on a gauge which has been sent recently to the factory for testing or adjustment, the problem then is to know how to compensate for increased altitudes.

The following table shows corresponding gauge pressures required to give a certain temperature at various altitudes.

Gauge pressure corresponding to specified process temperatures at various altitudes.*

Temp. Deg. F.	Sea Level	Feet above sea level							Temp. Deg. C.
		500	1000	2000	3000	4000	5000	6000	
225	4.2	4.5	4.7	5.2	5.7	6.2	6.6	7.1	107.2
240	10.3	10.5	10.8	11.3	11.7	12.2	12.7	13.1	115.6
250	15.1	15.4	15.6	16.1	16.6	17.1	17.5	18.0	121.1

*This table is taken from the National Canners Association Bulletin 26-L (Third Ed.) "Processes for Non-Acid Canned Foods in Metal Containers." June 1937.

Farmers Bulletin No. 1762 gives a rule which is accurate for making proper allowance for altitude corrections: "At altitudes over 2,000 feet, add 1 pound pressure for each additional 2,000 feet." The above table shows that the pressure gauge will have to indicate 3 pounds greater pressure at 6,000 feet elevation than at sea level in order to give the same process temperature.

Preparation of Jars, etc.

Preparing glass jars for use. Examine glass jars and caps before using to make certain that they are in good condition. Discard any jars or caps showing cracks, chips, or dents, and any caps with loose linings. Tighten loose wire clamps on the jars.

Wash the jars, also zinc and glass caps, in soapy water and rinse. Place them in a pan of warm water with a rack or cloth in the bottom to prevent bumping. Bring to the boiling point and keep hot until required. Jars for open kettle canning should be sterilized by 15 to 20 minutes boiling. When jars are packed with food and then processed they do not need to be sterilized first, but should be clean and hot when filled. Prepare jar caps that have a sealing composition by pouring boiling water over them and allow them to stand until used. Dip rubber rings into boiling water before adjusting on the jars.

Head Space. When food is processed in glass jars, a head space is left at the top to permit expansion of the food. Head space is measured from a straight edge laid across the top of the jar. Allow ½ inch of head space in all jars except those containing starchy foods (corn, peas); they require 1 inch because of greater expansion. The solid material in jars should be covered by liquid—water, syrup, or broth, as the case may be.

Exhausting and cooling glass jars. All types of glass jars can be adjusted to allow the exhausting, or passing out, of air from the food during processing.

With the mason jar, the cap is screwed on until it is tight and then turned back ¼ inch. After processing, the cap is screwed down as tightly as possible on the jar. With the "lightning-type" modified mason the top clamp is snapped into place and the side clamp is left up. After processing, the side clamp is pushed down. In both of these jars the actual seal is formed by the pull of the partial vacuum in the jar during cooling. Hence, it is better if these jars are cooled in an upright position.

With the vacuum- or self-sealing jars, no special adjustment is used for exhausting the air. The screw bands are put on tight or the clamps adjusted. During the processing period, the top is held in place by the band or clamp, which allows the air to escape but holds the top to the jar. When the jar starts to cool after processing, the steam condenses, and a partial vacuum is formed within. Greater pressure outside the jar than inside presses the top down firmly, and the seal is formed between top, gasket, and jar. The sealing material hardens as the jar cools, making the seal complete. If the screw band is loose after processing, hold the lid in place so it will not turn, and screw the band tight. Jars of this type must be left to cool in an upright position. When the jars have cooled, remove the screw bands and clamps and save them to use again.

Cool all glass jars in air out of drafts. Special care should be taken to protect the jars that have just been taken from a pressure cooker, as the temperature of the food is still above the boiling point. This places the glass under considerable strain, and breakage may occur if a draft strikes the jars. Leaving the jars in the cooker for 3 or 4 minutes after cooker has been opened will reduce the danger of breakage. Use a jar lifter or tongs to remove the jars from the pressure cooker.

Do not cover the jars with cloths or blankets while cooling as this prolongs the cooking of the food and may result in flat-sour spoilage. The processing period is adequate to make the food keep, and cooling should follow at once.

After processing and cooling, all types of glass jars should be inverted and observed for leakage.

Loss of liquid from glass jars during processing. When glass jars are processed in the steam pressure cooker, there is frequently a loss of liquid. While this may occur to some extent with all types of jars, it is generally less with those of the vacuum-sealing type which have a separate rubber ring or sealing composition in addition to the glass or metal cap and screw band. Mason and lightning-type mason jars are partially sealed before they are put in the cooker, and the seals are completed as soon as they are taken out. Tight sealing of these jars will not prevent the loss of liquid during pressure processing and may cause the rubbers

to push out, thus making a tight seal difficult to obtain. For adjustments of the different types of jars, see preceding material. Steps can be taken to reduce the loss of liquid by properly regulating the pressure cooker.

During water-bath processing, the water should cover the jars at least 1 to 2 inches and should be kept boiling constantly.

Never open the jars after processing to add more liquid.

Removing jar caps. To remove caps from the self- or automatic-sealing jars, puncture the caps to release the vacuum and lift up. For other types of jars, pull out the rubber ring with the fingers or with pliers. If this is difficult, invert the jar in warm water, covering the cap, and allow the jar to remain for several minutes. This will soften the rubber ring and make is easier to remove.

Directions for Canning Vegetables and Soup Mixtures

Emphasis must be laid again on the importance of using the steam pressure cooker for vegetables and meats, and the necessity for following directions carefully both in the operation of the cooker and methods of canning.

Corn.—Use only tender freshly gathered sweet corn. Husk, remove silk and wash. Cut the corn from the cob deep enough to remove most of the kernels without the hull. Do not scrape the cob. Add 1 teaspoon of salt to each quart of corn and half as much boiling water as corn by weight. Heat to boiling point and pack into containers at once. Process immediately; 60 minutes for pints, 70 minutes for quarts, at 10 pounds pressure.

If desired, the corn can be cut with a sharp knife, cutting off the tops of the kernels, and with the back of the knife scrape out the pulp. This gives a different product and utilizes all of the corn. Add 1 teaspoon of salt to each quart and half as much boiling water as corn by weight. Heat to boiling point, fill the containers and process immediately; 75 minutes for pints or quarts at 15 pounds pressure.

Peas.—Use only tender peas. Wash, shell, and wash again. Add hot water to cover and simmer for 5 minutes. Pack hot. Cover with hot water. Add ½ teaspoon of salt to each pint. Process immediately; 45 minutes for pints or quarts, at 10 pounds pressure. (Young, tender peas are preferably canned in pints, because they become over-cooked and mushy in quart containers.)

Beets, baby.—Select young, tender beets, preferably of the turnip-shaped varieties. Trim off the tops, but leave on at least 1 inch of the stems and all of the roots to prevent bleeding. Wash thoroughly and scald in boiling water or steam for about 15 minutes, or until the skins slip easily. After the beets are skinned and trimmed, pack into the containers. Add 1 teaspoon of salt to each quart, and fill with hot water. Process immediately; 30 minutes for pints or 35 minutes for quarts, at 10 pounds pressure.

Pumpkin.—Wash, peel, and cut the pumpkin into 1 to 1½ inch cubes. Add a small quantity of water and simmer until heated

through, stirring occasionally. Pack hot into containers, add 1 teaspoon of salt to each quart, and cover with the water in which cooked. Process immediately as directed in table. (60 minutes for pints, 70 minutes for quarts, at 10 pounds pressure.)

Squash.—Same as pumpkin.

Mushrooms.—Wash thoroughly, peel mature mushrooms, and drop into water containing 1 tablespoon of vinegar per quart. Precook, place in a wire sieve or colander, cover with a lid to hold the mushrooms under water, and immerse for 3 to 4 minutes in boiling water that contains 1 tablespoon of vinegar and 1 teaspoon of salt per quart. Fill into containers at once and cover with freshly boiling water. Add 1 teaspoon of salt to each quart. Process immediately as directed in timetable. (25 minutes for pints, 35 minutes for quarts, at 10 pounds pressure.)

Vegetable-soup mixtures.—The combinations of vegetables for soups may include two or more of the following: Tomato pulp, corn, peas, carrots, turnips, onion. Wash and trim the vegetables and cut into small pieces or cubes. Keep the diced carrots and turnips covered with water or weak brine to prevent darkening. Seasonings should be light, and may include sugar, salt, white pepper, dashes of cayenne and garlic, parsley, thyme, and bay leaf.

Bring the soup mixture to the boiling point and pack hot with sufficient liquid to cover the vegetables and prevent too dense a pack. Process as directed in timetable. (60 minutes for pints, 70 minutes for quarts, at 10 pounds pressure.)

Precooking in Tin Cans

This method can be used only with tin cans. Pack two or more pieces of meat into each can, and place the filled but open cans in a bath of boiling water that comes to within 1½ to 2 inches of the top of the can. Cover the bath to hold in steam and heat, being careful that water from the bath does not bubble into the cans. Continue heating until the meat is steaming hot, or 170° F., at the center of the cans, and has practically lost its color when raw. If no thermometer is available, turn out the meat from a few of the cans to be sure it is heated through. The time required is about 40 to 50 minutes for No. 2 cans of beef or pork, and somewhat less for chicken. Press the meat down and be sure it is covered with broth and that there is proper head space in the cans. Seal at once and process immediately.

Timetable for processing non-acid vegetables in the steam pressure canner*

The processes given here apply to places with altitudes of 2,000 feet or less. At altitudes over 2,000 feet, add 1 pound pressure for each additional 2,000 feet. Follow the directions for operation of canner and removal of jars and cans after processing. Cool tin cans in cold water immediately after processing.

Product	Pint Glass Jars		Quart Glass Jars		No. 2 tin cans		No. 3 tin cans		Type of tin can
	240° F., or 10 pounds pressure	250° F., or 15 pounds pressure	240° F., or 10 pounds pressure	250° F., or 15 pounds pressure	240° F., or 10 pounds pressure	250° F., or 15 pounds pressure	240° F., or 10 pounds pressure	250° F., or 15 pounds pressure	
	Minutes	Minutes	Minutes	Minutes	Minutes	Minutes	Minutes	Minutes	
Asparagus	30		35		30				Plain tin
String beans	30		35		25		30		C enamel or plain tin
Beets, Baby	30		35		30		30		Sanitary enamel
Corn:									
Whole-grain	60		70		50		65		C enamel
Cream-style	75		85			70			C enamel
Greens, including spinach		60		65		55		No.2½, 60	Plain tin
Peas:									
Green	45				40				Plain tin
Black-eyed	50		55		40		50		Plain tin or C enamel
Pumpkin		60		75		60		70	Sanitary enamel
Squash		60		75		60		70	Sanitary enamel
Vegetable soup mixtures	60		70		50		65		Plain tin
Mushrooms	25		35		25		25		Plain tin

* Taken from U. S. D. A. Farmers' Bulletin No. 1762, "Home Canning of Fruits, Vegetables, and Meats."

Score Card*

Fruits and Vegetables

Package—Tightly sealed containers of specified size, clean, neatly labeled, clear glass or tin cans. (If tin cans are used, they should be bright, having slightly concave ends, showing some vacuum. A gauge may be used to determine the vacuum.) 10

Pack 30

Fullness—All space, except proper headspace should be filled. 10

Uniformity—Pieces of fruit or vegetable should be reasonably uniform in size. (Fancy pack not practical.) 10

Proportion of fruit or vegetable to liquid—The liquid should just cover the product. 10

Product 40

Absence of defects—Original material of good quality and degree of maturity, free from indications of spoilage. 10

Uniformity 10

Color—As nearly that of the original as is possible after cooking. Free from artificial matter.

Consistency—Tender without overcooking.

Flavor—Characteristic of the fruit or vegetable. 20

Liquid 20

Clearness—Little or no cloudiness or small particles, free from gas bubbles.

Syrups for fruits.—Suitable proportion of sugar.

100

Evidences of Spoilage**

Foods canned in tin sometimes show the following evidences of spoilage:

Buckled cans.—Cans that have caved in, or collapsed, on the sides are called buckled cans. This may occur when No. 3 or larger-sized cans are cooled too quickly after processing. These large cans should be allowed to remain in the cooker until the gauge has reached zero to avoid too sudden change in pressure. Cans of smaller sizes when slack-filled sometimes buckle on cooling and break the seams. In this case the food should be put into other cans and reprocessed, or used at once.

Springers.—Springers are cans with bulged ends. The ends of cans generally become convex, or outwardly curved, during pro-

*From score cards adopted by Bureau of Home Economics, Washington, D. C.

** Taken from U. S. D. A. Farmers' Bulletin No. 1762, "Home Canning of Fruits, Vegetables and Meats."

cessing because of expansion of the food and the formation of steam. When the cans cool the ends should snap back to a concave, or inwardly curved position. If a can is too full, the ends may not snap back into proper position, and the can is called a springer. Such cans should be marked so they will not be confused with those that become bulged during storage.

Swelled cans.—When gas is formed within a can it may cause the ends of the can to bulge. For example, some fruits, such as prunes, apples, and some berries, react with the metals of the can, and hydrogen gas is liberated. When this collects the can may become a "hydrogen swell." In this case the food itself is not affected. However, in several types of food spoilage, gases are produced that cause swelled cans. For this reason bulged ends on a can are regarded as an indication of spoilage. When canned fruits show such a condition, they should be examined for other indications of spoilage. When a can of meat or non-acid vegetables has bulged ends, it should be disposed of by burning.

Perforations.—Some of the fruits that react with the metals of the can producing hydrogen swells may also cause perforations and leaks. This results from the centering of the chemical reaction on a few points. If the can is discovered soon after leaking starts the food may be used, but if the leakage is not detected until later, fermentation or other types of spoilage may have set in.

Canned foods are likely to develop perforations and hydrogen swells rather quickly if stored in too warm a place, hence cool storage is especially important for canned fruits that react in this way on the metal.

Frozen Canned Foods

Freezing does not cause canned foods to spoil unless it breaks the seal and permits micro-organisms to enter. All frozen canned foods should therefore be examined for leakage. Sometimes freezing may bulge tin cans and spread the seams enough to permit bacteria to enter and yet not cause leakage. Bulged cans of frozen food, therefore, should be used as promptly as possible if they cannot be kept frozen.

Suggestions for Club Meetings

First Meeting—*Organization*

1. Call to order.
2. Election of officers.
3. Explanation of requirements by leader.
4. Discussion of the work to be done.
5. Explanation of methods to be used in canning.
6. Demonstration by leader on steam pressure cooker.
7. Plans for next meeting. Appointment by leader of two demonstration teams.
8. Song.
9. Club pledge.
10. Dismissal.

Second Meeting

1. Call to order.
2. Roll call.
3. Demonstration by team on preparation of jars and use of steam pressure cooker.
4. Judging demonstration by second demonstration team.
5. Announcements by leader and appointment of demonstration team for next meeting.
6. Plans for third meeting.
7. Song.
8. Club pledge.
9. Dismissal.

Third Meeting

1. Call to order.
2. Roll call.
3. Demonstration of canning vegetables (any available vegetables in season).
4. Discussion by club of demonstration given.
5. Selection of demonstration team for following meeting.
6. Report on home work done.
7. Club pledge.
8. Dismissal.

Fourth Meeting

1. Call to order.
2. Roll call.
3. Discussion by leader of reasons for spoilage, dangers of botulinus poisoning and how to prevent it.
4. Plans for following meeting. Leader appoint demonstration team.
5. Directions for canning soup mixtures.
6. Demonstration of canning vegetables by demonstration team.
7. Club pledge.
8. Games.
9. Dismissal.

Fifth Meeting

1. Call to order.
2. Roll call.
3. Judging demonstration on vegetables by team selected at previous meeting.
4. Report on home work.
5. Check on record books.
6. Song.
7. Club pledge.
8. Dismissal.

Sixth Meeting

1. Call to order.
2. Roll call.
3. General discussion by leader and club members on causes of spoilage, preparation of jars and steps necessary to follow in canning.
4. Plans for Achievement Day.
5. Selection of demonstration team for following meeting.
6. Song.
7. Club pledge.
8. Dismissal.

Eighth Meeting

1. Call to order.
2. Roll call.
3. General judging demonstration. Judging done by all members.
4. Report on home work.
5. Check on record books.
6. Plans for Achievement Day.
7. Plans for next meeting, which might be Club Picnic, with appointment of committees for it.
8. Club pledge.
9. Games.
10. Dismissal.

Ninth Meeting

1. Club picnic if desired. Record menu.
2. Leader select demonstration team for next meeting.

Tenth Meeting

1. Call to order.
2. Roll call.
3. Demonstration by team selected by leader at previous meeting.
4. Review points on judging.
5. Make plans for exhibit at fair.
6. Announcements by leader.
7. Club pledge.
8. Dismissal.

Eleventh Meeting

1. Call to order.
2. Roll call.
3. Report on home work done by individual members.
4. Leader check on completion of requirements.
5. Conduct judging demonstration (by all members).
6. Plans for Achievement Day.
7. Club pledge.
8. Games.
9. Dismissal.

Twelfth Meeting

Achievement Day.—Record books are to be turned in for the final completion of the project, and the club may present exhibits of work done or other activities suitable for the achievement day program.